

A SURVEY OF SUMMER TIGER BEETLES ON OHIO RIVER BEACHES IN OHIO AND EASTERN INDIANA¹

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ABSTRACT: A survey of the riparian tiger beetles of the Ohio River Valley from eastern Ohio to eastern Indiana was conducted during May through August of 1995 and 1996. It has provided the first composite analysis of tiger beetle distribution along the river and, combined with the river's recent history, suggested likely causes for declines in riparian tiger beetle populations. The current distribution of *C. repanda* and *C. cuprascens* shows how water management by locks and dams has affected tiger beetle diversity including the extirpation of *C. hirticollis* from the Ohio River Valley and the reduction of *C. marginipennis* to one isolated population in eastern Ohio. The survey also found 6 new county records including the easternmost record of *C. cuprascens* and the first Ohio River record of *C. marginipennis*.

Three species of riparian tiger beetles, *Cicindela hirticollis* Say, *C. cuprascens* LeConte, and *C. marginipennis* Dejean, are currently listed in the special interest category by the Ohio Department of Natural Resources Wildlife listings, which means too little is known about their distribution to allow for a true evaluation as to their abundance. These species are sensitive to habitat destruction and in other states have declined or been extirpated (Graves and Brzoska 1991). Previous efforts to map these species' distributions in Ohio (Graves and Brzoska 1991) and in Indiana (Knisley et al 1987) relied primarily on museum records and inland collecting efforts. To determine the current status of these riparian species we conducted a beach survey of the Ohio River and its tributaries from eastern Ohio to eastern Indiana.

MATERIALS AND METHODS

Because the targeted species, *C. hirticollis*, *C. cuprascens*, and *C. marginipennis*, are summer species, we concentrated our survey during May through early August of 1995 and 1996. The scouting of potential sites was completed by using 16 and 14 foot speedboats to provide a more accurate coverage of the beaches, bars, and islands along the Ohio River. Once a beach was found, its location was determined using a global positioning system and its tiger beetle fauna was sampled using aerial nets. Voucher specimens were collected and deposited in the Cincinnati Museum of Natural History and Science.

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RESULTS

Nearly 300 miles of the Ohio River and its tributaries were surveyed. Tiger beetles were found at 78 sites. The most common species found was *C. repanda* Dejean (figure 1) which was found throughout the Ohio River Valley. *C. cuprascens* was less common, occurring in 25 localities (figure 2) primarily in western Ohio and eastern Indiana. *C. marginipennis* was found in two widely separated locations (figure 3) in Hamilton and Meigs counties in Ohio. *C. hirticollis* was not found anywhere along the Ohio River. Non-riparian tiger beetles were occasionally collected. *C. sexguttata* Fabricius was collected on narrow sandy beaches that bordered wooded areas and *C. punctulata* Oliver was found on beaches that were adjoining farms or other disturbed habitats. Localities and the species collected are provided as an appendix.

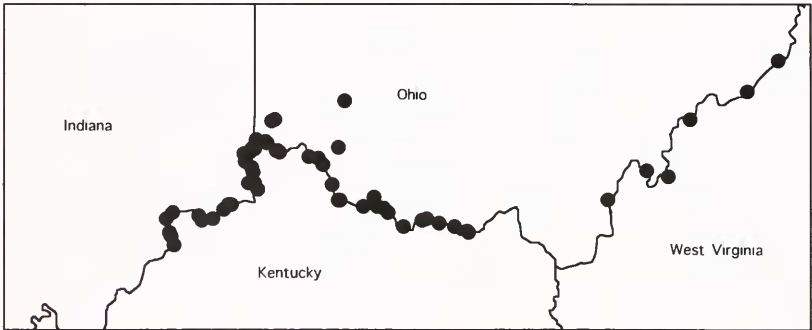


Figure 1. *C. repanda* and its Ohio River distribution.

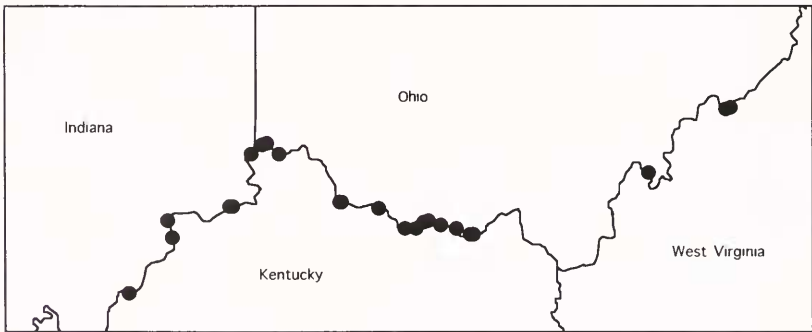


Figure 2. *C. cuprascens* and its Ohio River distribution.

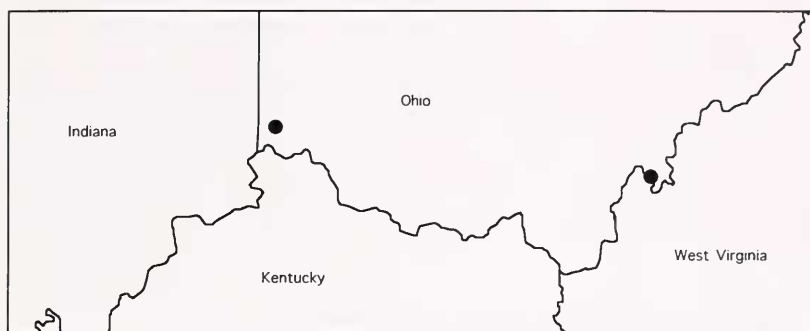


Figure 3. *C. marginipennis* and its Ohio River distribution.

DISCUSSION

This two year survey of tiger beetles along the Ohio river marked the first time the Ohio River was so thoroughly surveyed for tiger beetles. *C. repanda* was collected for the first time in Switzerland and Ohio Counties in Indiana. *C. cuprascens* was collected for the first time from Switzerland and Ohio Counties in Indiana, Meigs County in Ohio, and from Pleasants County in West Virginia. The West Virginia locality is the farthest east that *C. cuprascens* has been reported (Acciavatti et al 1992). *C. marginipennis* was found in Meigs County, Ohio, which was the first time the species has been reported from along the Ohio River. The specific collection information for the new records is presented in bold type in the appendix.

C. hirticollis had been collected in Hamilton County, Ohio in 1911 (voucher specimen in the Cincinnati Museum of Science and History) but was not found during the two years of our survey. We believe it has been extirpated from southwestern Ohio (Kritsky et al 1996).

Graves and Brzoska (1991) warned of declines in populations of *C. hirticollis*, *C. cuprascens*, and *C. marginipennis* and argued that these species should be better protected. To better understand the specifics of the declines, we studied the history of the Ohio River from eastern Ohio to central Indiana, trying to document changes along the river that would have impacted the abundance of riparian tiger beetles.

The shores along the Ohio River have changed a great deal during the past two centuries. The Navigator (Anon 1814), a publication of river descriptions created to help boat pilots course the Ohio River, indicated that in the early nineteenth century, the Ohio River ran dry during the summer months. Sandy beaches, sandbars, and willow islands were common along the Ohio River from eastern Ohio through east central Indiana. These locations are ideal

habitats for *C. hirticollis*, *C. cuprascens*, and *C. repanda*. Areas east of Portsmouth and along what is now Meigs County were apparently more rocky, which is the preferred habitat for *C. marginipennis*.

During the latter part of the Nineteenth Century a series of locks and dams were built on the Ohio River to facilitate river transportation. This construction continued into this century. As new locks were completed, older ones were removed. The most recent locks and dams were completed during the 1990s. The impoundment of water and flood control has had a great effect along the shores of the Ohio. The effect is most severe in eastern Ohio where seven locks and dams are in use. The water impoundment submerged the sandy shores and bars that were present in 1814 and replaced them with high banks.

Today, pockets of sandy beaches occur down river of a lock and dam due to the generally lower water levels, and these beaches have dense populations of tiger beetles. The banks five to ten miles up river from a lock and dam are devoid of sandy beaches and thus have no tiger beetles. Figure 4 shows the effects of the locks and dams on tiger beetle distribution. The current locations of locks and dams are indicated by the black lines and the dots show the locations of tiger beetle inhabited beaches. Every lock and dam from eastern Indiana to eastern Ohio showed the same effects; a few suitable tiger beetle localities immediately down river from the dam and a large span of up to ten miles up river without suitable tiger beetle habitats.

The history of the locks and dams may therefore be the key to understanding the recent tiger beetle history in the Ohio River Valley in southwest Ohio. In 1916, there were seven locks and dams in western Ohio and eastern Indiana that have been since removed, and during the time of their operation, western Ohio and Eastern Indiana had higher river levels and fewer beaches for tiger beetles. One victim of this circumstance was *C. hirticollis*. While the loss of

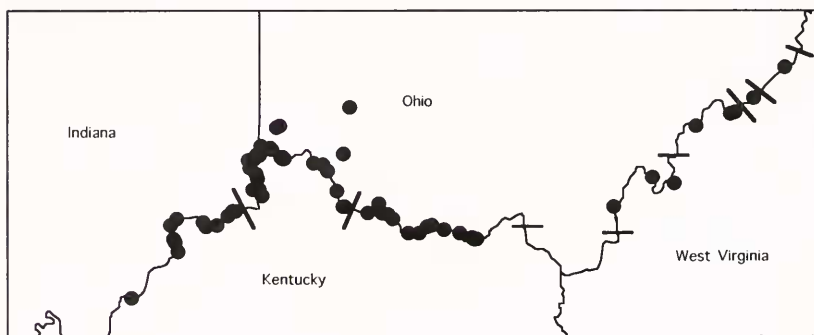


Figure 4. The Ohio River's distribution of the riparian tiger beetles with the locks and dams indicated by black lines.

beaches would have destroyed the tiger beetles' habitat in the area, *C. hirticollis* was not in a position to recover as were the other species. By comparison, *C. repanda* is common along the smaller streams and creeks. If its populations along the Ohio River were reduced or obliterated, it could have moved back to the Ohio River from the streams after the removal of the seven locks and dams later in this century. Similarly, *C. cuprascens* is common on the willow islands found on the Ohio River. While the dams would have caused the submergence of many beaches, the willow islands would have survived and served as refugia for *C. cuprascens* populations to repopulate the reformed beaches after the dams were removed.

C. hirticollis was not as fortunate. Unlike *C. repanda* and *C. cuprascens*, this species is very sensitive to habitat alterations. In areas along Lake Erie where *C. hirticollis* is still present, it is only found in areas where human activity is limited. In the late nineteenth century, the streams in southwestern Ohio were heavily polluted, which would have likely destroyed any *C. hirticollis* populations already present and blocked the dispersal of *C. hirticollis* upstream as the construction of the many locks and dams in southwestern Ohio proceeded. Therefore, when the Ohio River beaches were lost to high river water, so too was *C. hirticollis*. Subsequently, when the locks and dams were removed, there were no *C. hirticollis* populations along the streams and creeks that flow into the Ohio to repopulate the beaches of the Ohio River.

C. marginipennis presents a completely different scenario. Today, *C. marginipennis* is found on cobblestone bars and beaches along the Scioto, Great Miami, and Little Miami Rivers. The 1814 Navigator (Anonymous) indicates that it may have had suitable Ohio River habitats east of Portsmouth and in Meigs County. The presence of *C. marginipennis* in Meigs County may be a remnant of this past habitat. Other cobble beaches along the Ohio River have since been destroyed by the lock and dam systems.

CONCLUSIONS

The tiger beetle survey of the Ohio River Valley from eastern Ohio to eastern Indiana yielded 6 new county records for three species including the easternmost limit of *C. cuprascens* and the first Ohio River record of *C. marginipennis*. The decline in the riparian tiger beetles of the Ohio River is likely linked to the history of the locks and dams used to control flooding and promote river traffic. Suitable tiger beetle habitats are more common immediately down river of locks and dams where river levels are lower. This suggests that river management to protect these sandy beaches would have a positive impact to protect and even promote tiger beetles in the Ohio River Valley.

APPENDIX

Collection data for the Ohio River riparian tiger beetles. Data is divided by state and presented with county, latitude in decimal degrees, longitude in decimal degrees, species collected, and date of collection.

INDIANA: Dearborn, 39.13, 84.8, *repanda*, 7/2/96; Dearborn, 39.11, 84.83, *repanda*, 7/2/96; Dearborn, 39.1, 84.84, *repanda*, 7/2/96; Dearborn, 39.07, 84.89, *repanda*, 7/2/96; Dearborn, 39.34, 84.51, *punctulata*, 8/5/96; Floyd, 38.28, 85.75, *cuprascens*, 7/29/95; Jefferson, 38.72, 85.23, *repanda*, 7/3/96; Jefferson, 38.7, 85.46, *repanda*, *cuprascens*, 7/9/96; Jefferson, 38.62, 85.44, *repanda*, 7/9/96; Ohio, 39.03, 84.88, *repanda*, 6/27/96; Ohio, 38.99, 84.84, *repanda*, 6/27/96; Switzerland, 38.87, 84.79, *repanda*, 6/27/96; Switzerland, 38.78, 85.01, *repanda*, *cuprascens*, 6/28/96; Switzerland, 38.78, 84.98, *cuprascens*, 6/28/96; Switzerland, 38.75, 85.04, *repanda*, 7/3/96.

KENTUCKY: Boone, 39.09, 84.66, *repanda*, *cuprascens*, 6/9/95; Boone, 39.13, 84.72, *repanda*, 6/9/95; Boone, 39.13, 84.77, *cuprascens*, 6/27/95; Boone, 39.14, 84.74, *repanda*, *cuprascens*, 6/27/95; Boone, 39.09, 84.66, *repanda*, *punctulata*, 7/12/95; Boone, 38.9, 84.86, *repanda*, 6/27/96; Boone, 38.9, 84.81, *repanda*, 6/27/96; Boone, 38.96, 84.83, *repanda*, *punctulata*, 6/27/96; Boone, 39.1, 84.82, *repanda*, 7/2/96; Boone, 39.08, 84.85, *repanda*, *cuprascens*, 7/2/96; Bracken, 38.8, 84.19, *repanda*, *cuprascens*, 6/16/95; Bracken, 38.77, 84.08, *sexgutatta*, 6/30/95; Bracken, 38.77, 84.02, *repanda*, 6/30/95; Bracken, 38.77, 84.02, *repanda*, 6/30/95; Bracken, 38.8, 84.19, *cuprascens*, 7/25/95; Campbell, 39.05, 84.42, *repanda*, 6/15/95; Campbell, 39.01, 84.31, *repanda*, 6/15/95; Campbell, 38.89, 84.24, *repanda*, 6/16/95; Carroll, 38.7, 85.12, *repanda*, 7/3/96; Carroll, 38.69, 85.2, *repanda*, 7/3/96; Lewis, 38.7, 83.55, *cuprascens*, *repanda*, 7/13/95; Lewis, 38.65, 83.34, *repanda*, *cuprascens*, 7/14/95; Lewis, 38.62, 83.24, *repanda*, *cuprascens*, 7/14/95; Mason, 38.77, 83.91, *punctulata*, *repanda*, *cuprascens*, 7/7/95; Mason, 38.76, 83.87, *repanda*, 7/7/95; Mason, 38.82, 83.94, *repanda*, 7/7/95; Timble, 38.6, 85.43, *repanda*, *cuprascens*, 7/9/96; Timble, 38.55, 85.41, *repanda*, 7/9/96; Trimble, 38.73, 85.42, *repanda*, 7/9/96.

OHIO: Adams, 38.69, 83.58, *repanda*, *cuprascens*, 7/13/95; Adams, 38.65, 83.64, *cuprascens*, *punctulata*, 7/13/95; Adams, 38.63, 83.25, *repanda*, *punctulata*, 7/14/95; Adams (Brush Cr. Is.), 38.67, 83.46, *repanda*, *cuprascens*, 7/14/95; Brown, 38.73, 83.83, *repanda*, 7/7/95; Brown, 38.65, 83.72, *repanda*, *cuprascens*, *punctulata*, 7/13/95; Clermont, 39.04, 84.35, *repanda*, 6/15/95; Clermont, 38.8, 84.2, *repanda*, *cuprascens*, 7/25/95; Clermont, 39.11, 84.2, *repanda*, 8/31/96; Hamilton, 39.08, 84.64, *repanda*, *sexgutatta*, 6/9/95; Hamilton, 39.08, 84.64, *cuprascens*, 7/12/95; Hamilton, 39.09, 84.64, *repanda*, 7/18/95; Hamilton, 39.08, 84.63, *repanda*, 7/18/95; Hamilton (Great Miami), 39.27, 84.67, *repanda*, 7/20/95; Hamilton (Great Miami), 39.26, 84.69, *repanda*, 7/20/95; Hamilton (Great Miami), 39.26, 84.69, *repanda*, marginipennis, 7/20/95; Hamilton (Great Miami), 39.26, 84.69, *repanda*, 8/1/95; Hamilton (Whitewater), 39.13, 84.8, *repanda*, 6/27/95; Hamilton (Whitewater), 39.13, 84.8, *repanda*, 7/18/95; Hamilton (Whitewater), 39.15, 84.8, *repanda*, 7/18/95; Hamilton (Whitewater), 39.15, 84.8, *repanda*, 8/1/95; Meigs, 38.97, 81.92, *marginipennis*, *cuprascens*, 7/26/96; Meigs, 38.94, 81.76, *repanda*, 7/26/96; Ross, 39.3, 82.94, *punctulata*, *repanda*, 7/11/96; Scioto, 38.62, 83.22, *cuprascens*, 7/14/95; Warren (Little Miami), 39.37, 84.15, *repanda*, 7/27/95.

WEST VIRGINIA: Jackson, 38.94, 81.76 *cuprascens*, 8/1/96; Mason, 38.8, 82.21, *repanda*, 7/26/96; Pleasants, 39.34, 81.35, *cuprascens*, 8/1/96; Pleasants, 39.35, 81.32, *cuprascens*, 8/1/96; Tyler, 39.43, 81.18, *repanda*, 8/1/96; Wetzel, 39.6, 80.95, *repanda*, 8/2/96; Wood, 39.27, 81.6, *repanda*, 8/1/96.

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